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Profitable Ewe Flock Management

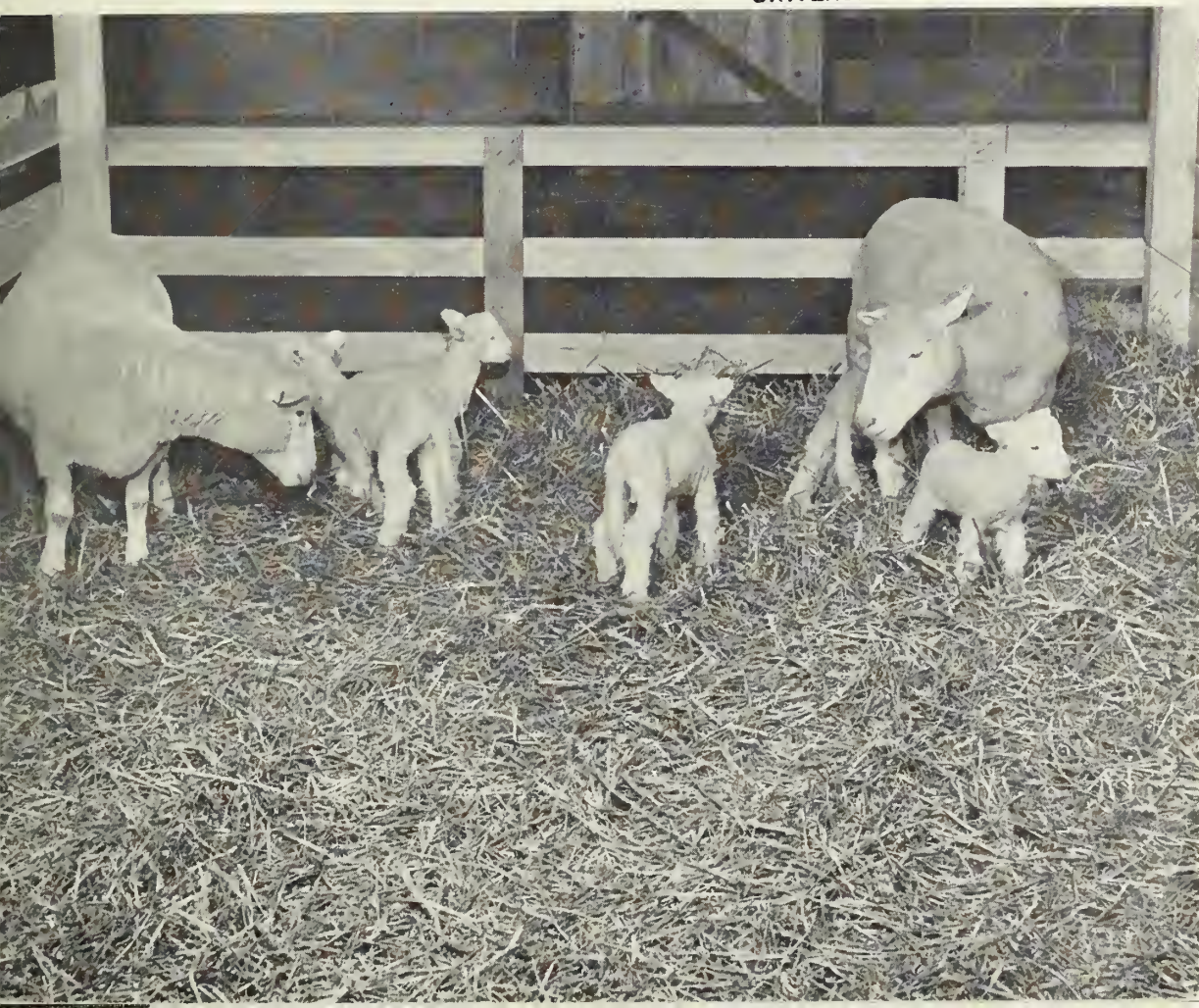
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The author wishes to express his appreciation to F. C. Hinds, B. B. Doane, A. D. Leman, and J. R. Romans for their contributions to this circular. (This circular replaces Circular 958.)

Profitable Ewe Flock Management

By G. E. Ricketts¹

Good management is the key to an efficient and highly profitable ewe flock. Too many flocks are used merely as fencerow scavengers. As a result, their productive ability and income potential are either completely overlooked or grossly neglected.

Most Illinois farm flocks are supplemental farm operations, but there are some farms on which sheep are the major livestock enterprise. Sheep economically convert available pasture and roughage into pounds of lamb and wool, and help provide for a more even distribution of farm labor requirements. Ewe flocks call for a smaller investment and show a greater return per animal unit than a beef cow herd.

Sheep are ideally suited to grassland agriculture, but there has been an increasing interest in partially confined or drylot operations, especially in the Midwest. Many of these operations will include some automation. It is possible for one man to handle up to 700 ewes in a highly intensified operation.

The trend in the sheep industry, as in beef and swine, is an ever-increasing demand for the production of a meat-type animal. The high degree of finish to which livestock have been fattened in the past is no longer tolerated. The housewife wants less waste fat on the meat she buys. In addition, extremely fat animals are not economical to produce, because an animal needs $2\frac{1}{4}$ times as much energy to produce a pound of fat as to produce a pound of muscle and bone.

What is a meat-type lamb? At present we believe it is an efficient, rapid-gaining lamb that will produce a highly desirable carcass, containing a minimum amount of fat and a maximum amount of muscle, especially in the leg and loin areas. To be more specific, lambs should weigh at least 90 pounds at 120 days of age, yield 50 percent or more when slaughtered, carry no less than 0.1 inch and no more than 0.3 inch of subcutaneous fat, have at least 2.5 square inches of loin eye, and grade at least choice on quality and conformation. Keep the meat-type lamb in mind when setting your production goals.

¹ Extension Specialist, Sheep and Beef Performance Testing.

RETURNS FROM COMMERCIAL EWE FLOCKS

There is a wide range in gross return and net return per ewe in Midwest ewe flocks. Flock-production summaries from various states, including Illinois, indicate that the top flocks consistently gross \$50 or more per ewe. Other flocks gross as little as \$20 per ewe. Gross returns are defined as the proceeds from the sale of lambs and wool and the incentive payment for both lamb and wool sales. A few outstanding flocks have grossed near \$60 per ewe on once-a-year lambing. The potential is even higher with a successful accelerated lambing program.

In England, where productivity is stressed more, the top flocks consistently wean near or above a 200-percent lamb crop on once-a-year lambing, even with flocks of over 400 ewes. This indicates that we need to become more conscious of productivity.

What is needed to get the highest gross return per ewe? A study of production-record summaries indicates that (1) all ewes should lamb, (2) a high percentage of multiple births is needed, (3) lamb mortality



High production is important for maximum profit.

must be kept low, (4) lambs must be marketed at desirable weights and when prices are highest, (5) longevity is very important, (6) heavy-shearing ewes and rams are highly essential, and (7) wool must be marketed in a desirable condition and at the highest possible price per pound. Essentially it all boils down to good management in all phases of the sheep enterprise.

SYSTEMS OF SHEEP PRODUCTION

Most Illinois farm flocks are commercial operations, used primarily to produce market lambs and wool. The most important factors in market lamb production are the number of lambs raised per ewe and the ability of lambs to gain rapidly from birth to marketing.

Commercial flocks use western ewes, native ewes, or both. Flock owners who use western ewes feel these sheep have several advantages over native ewes. They are available in larger numbers, can be obtained in more uniform groups, have fewer parasites, and are usually more hardy.

Native ewes generally cost less per head, often show more desirable mutton conformation, and are often more productive. Many flock owners with native ewes also produce their own replacements.

Northwest ewes are preferred over southwest ewes because northwest ewes generally are larger, show more desirable mutton conformation, produce more wool, and have fewer parasites. However, southwest ewes need less feed and the initial cost per head is less. In recent years the southwest ewes have been improved in size and quality.

Mature ewes with solid mouths are available on the market each fall. If these are ewes that have been sold in order to decrease flock numbers they may be a good investment. However, many of these marketed ewes have been culled because they did not lamb, did not raise a lamb, or raised lightweight or inferior-quality lambs, and are not good breeding ewes.

Broken-mouth ewes and gunmers are also available. Most of them have been good producers or they would not have been retained so long in the original flock. These ewes generally require extra care and management. If a person buys these ewes, he should count on only one or two lamb crops and then sell the ewes as well as the lambs.

The main purpose of maintaining purebred flocks is the production of breeding stock for commercial flocks and for other purebred flocks. A purebred flock can help a farmer increase his income without increasing the number of ewes he owns. It takes good individual sheep but does

not require a large flock. The purebred flock owner must be a good sheepman and must be able to sell. He must also be honest in his dealings and have breed improvement as one of his major goals. When selecting a breed, consider the market for breeding stock and the availability of breeding stock in your area. If there is a demand for several breeds, the choice of breed can be based on personal preference and availability.

SPECIALIZING IN SHEEP PRODUCTION

The downward trend in the number of sheep has been going on for some time. However, lamb prices have been relatively strong for several years. This could mean that many sheepmen have not been serious enough about sheep production. Many flocks are too small for economical production and should be enlarged to contribute a greater percentage of the livestock income. Such enlargement would also consequently warrant more management attention. Instead of 25 or 30 ewes in the flock, some flock owners should be thinking in terms of at least 10 times that many.

In this day and age of specialization, very few Midwestern farmers specialize in sheep production. This is unfortunate because there is a



Automated feeding of brood ewes may become more common in large intensified sheep operations.

great potential for large, specialized ewe flock operations in the grassland areas as well as right in the heart of the cash-grain areas. Production can be intensified on a pasture system or in drylot, or the two systems can be combined.

Sheepmen who plan to specialize in sheep production may want to consider some automation, especially where feeding and feed handling are concerned. Automation increases the overall cost of the operation, but it greatly reduces the total labor requirement.

In general, sheepmen have been slow to accept new ideas, and this has hurt the sheep industry. There is a great deal of information available today that can help people do a better job of production and to receive a greater profit from their flocks. Why shouldn't we see flocks with 500 to 1,000 ewes here in the Midwest? We should, and we will in the not too distant future.

There continues to be a growing interest in the possibilities of using slotted floors in sheep production, and Illinois is one of the leaders in



Slotted floors have been used successfully in sheep production at the Dixon Springs Agricultural Center.

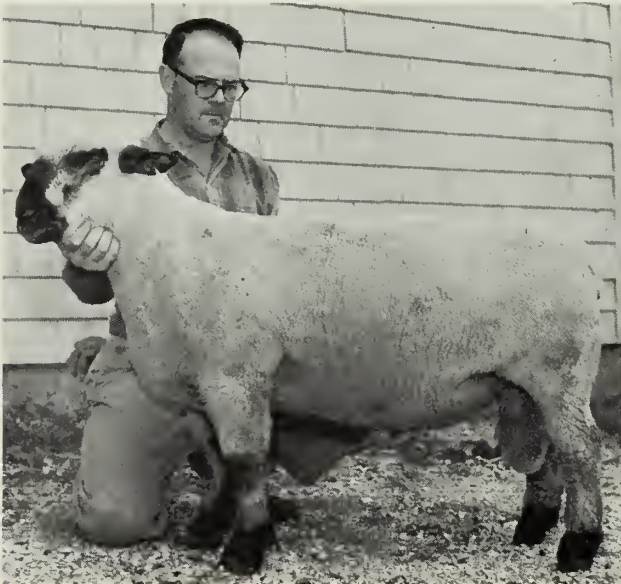
conducting research work in this area. Several large commercial sheep operations in Virginia have been using slotted floors for several years. Some of the advantages include the elimination of bedding, great reduction or elimination of the internal parasite problem, and a reduction of the floor-space requirement per animal.

The information compiled in recent years concerning ewe and ram fertility, confinement rearing, early weaning, creep feeding, slotted floors, accelerated lambing, synchronization, ewe feeding and management, production testing, and carcass evaluation is available to help you profitably expand your sheep operation. There is no good reason why our sheep industry can not take advantage of these advances.

SELECTION OF EWES AND RAMS

Selecting good breeding stock to start or expand an operation, whether purebred or commercial, is an extremely important part of livestock management. To make the most rapid progress in flock improvement, you must use good stud rams, and it is here that many producers are most negligent. Selection of a stud ram is a major decision and not something to be done on the spur of the moment. You can't expect to buy an outstanding sire for market price. Neither can you expect outstanding results from a scrub. Give some time and thought to the selection and management of your stud ram.

Criteria for selecting breeding stock:



This October-born ram weighed 71 pounds at 66 days of age and 111 pounds at 109 days of age.

1. **Growthiness (size for age).** Select rapid-gaining sheep that meet your other standards. Rapid-gaining animals usually make the most efficient use of feed and can be marketed at a younger age. A slow-growing lamb is not so profitable as a fast-growing lamb. Set as your goal to have twin lambs weighing at least 70 pounds and single lambs weighing at least 80 pounds at 90 days of age (if creep-fed), and then select breeding stock with the gaining ability to produce such lambs.

2. **Soundness.**

- a. **Feet and legs.** When their feet are well trimmed, sheep should be able to stand squarely on them. Select sheep that have short, strong pasterns and straight legs with plenty of width between them. Crooked legs and weak pasterns can decrease an animal's ability to move and perform normally, and can decrease its years of reproductive usefulness.
- b. **Mouth.** Check the sheep's mouth for age, condition of the eight incisors, and jaw malformations like monkey mouth or parrot mouth.
- c. **Udder.** If ewes have produced at least one lamb crop, check their udders to be sure that both teats are present and functional and that there are no lumps or hard areas.
- d. **Testicles.** Check the ram to be sure both testicles are present, fully descended, sound, and nearly equal in size.

3. **Conformation.** The ideal conformation probably varies from one breed to another. However, there are times when you can find about as much variation between animals of the same breed as you can between different breeds. In general, a sheep with good conformation has the following qualities: (a) wide chest; (b) smooth shoulders; (c) fullness through the heart area and the spring of ribs; (d) long body, with major emphasis on length from the last rib to the dock; (e) wide and straight top; (f) long, wide, and level rump; (g) deep, thick, and full leg of lamb or mutton; and (h) overall balance (blending together of body parts).

4. **Condition of birth (single, twin, or triplet).** Your first choice should always be ewes and rams of multiple birth. Progress can be made in increasing lambing percentage by selecting for twinning. Under mid-western conditions, a good set of twins is more profitable than a good single lamb. The idea that twinning is economically important is not new; in 1837 Youatt wrote: "Ewes yearly by twinning/Rich masters do make; /The lambs from such twinners/For breeders go take."

5. **Previous performance.** When you buy breeding stock, get all the performance information you can — such factors as weight at 90 days

and weight at one year of age. Find out the performance of their progeny, if any. Also check the performance of sires and dams. Some breeders have carcass information available, so check on this also.

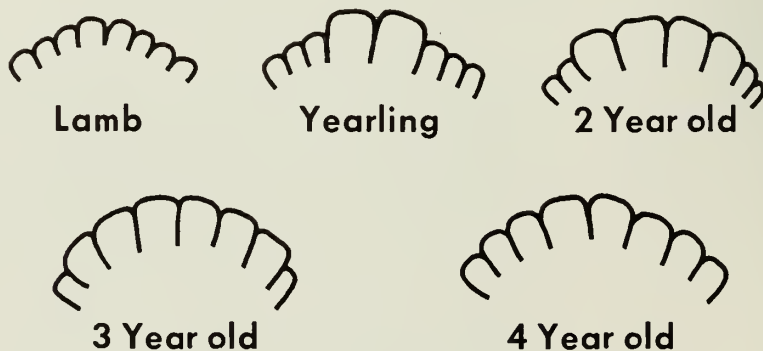
6. Substance (amount of bone). Select heavy-boned sheep. In general, heavy-boned animals do better than fine-boned ones.

7. Wool. Select heavy-shearing sheep that have dense, uniform, high-quality fleeces, with no dark fiber. This is one factor that is often neglected in sheep selection, but should not be since wool makes a sizable contribution to the gross income from a sheep enterprise.

8. Age. Select the younger ewes because they have more productive years ahead than older ewes. Even though yearlings cost more than older ewes, their cost per lamb produced is usually less. Yearling ewes have more productive years ahead of them, have sounder udders, and have a lower death loss. Ewes generally reach peak productivity at four to six years of age.

The age of the ram will determine how many ewes he can service. Under normal field mating conditions a ram lamb can be used on about 15 ewes, a yearling ram on 25 to 35, and an aged ram on 35 to 45. A good rule of thumb is three mature rams for every 100 ewes in the breeding flock.

The age of sheep can be determined by their teeth. Lambs are born with eight milk teeth, or incisors, arranged in four pairs in the lower jaw. The center pair is shed at approximately one year of age and replaced by larger, permanent teeth. When the sheep is two years old, the second pair of permanent teeth replace the second pair of milk teeth; and at three and four years the third and fourth pairs of permanent teeth appear. At four years of age the sheep has a "full mouth." When a ewe loses part of her incisor teeth, she is called a "broken-mouth" ewe. Ewes with no incisors are called "gummers."



The age of sheep can be determined by their teeth, as is illustrated here.

9. **Sex character.** Ewes should look feminine and rams should look masculine. Masculine rams are generally more rugged, active, and aggressive than rams which lack this quality.

10. **Breed type.** Breed type is an important consideration in pure-bred livestock. Without it breed identity is lost. Even though breed type is important, do not get carried away to the point where you forget all else. It needs to be appraised along with the other factors listed here.



This ram indicates the growthiness, ruggedness, muscling, soundness, length of body, balance, and masculinity that are desirable in a stud ram.



The fact that growthiness, desirable type, and desirable conformation can all be contained in the same sheep is pointed out in this outstanding set of twins. The ram lamb weighed 132 pounds at 103 days of age and the ewe lamb weighed 117 pounds at 105 days of age. Both lambs did exceptionally well on the show circuit.

USE OF PRODUCTION RECORDS

Production records, if well kept, can be a useful tool to both commercial and purebred flock owners. They are especially important in flocks that produce breeding stock or that retain ewe lambs for replacements.

Production records can be used to:

1. Measure flock productivity.
2. Provide permanent records.
3. Identify top-producing ewes so their lambs can be kept for breeding stock.
4. Help cull low producers.
5. Evaluate ram performance.
6. Show differences in gaining ability of lambs.
7. Supplement what can be seen with the naked eye.

The records do not have to be kept in great detail. Include the following information on the record: ewe identification number, date of lambing, number and sex of lambs born, sire of lambs, age and weight of lambs weaned, and fleece weight of the ewe. Any additional information you want can also be included.

You should carry out a production testing program on your purebred flock if you expect to be a progressive breeder. Such tests will enable you to evaluate your breeding program, make sounder replacement selections, and provide information that will aid in selling breeding stock. If you are a purebred breeder, you should also obtain carcass information on some of your lambs to determine if you are producing the desired meat-type lambs.

Table 1. — Pounds of Lamb Weaned at 90 Days
From High- and Low-Producing Ewes

Ewes raising singles		Ewes raising twins	
High	Low	High	Low
87.1	44.6	148.2	77.7
85.2	46.9	143.1	86.6
84.2	47.5	142.7	92.2

Tables 1 and 2 point out the large differences in ewe productivity and lamb gains that can exist within a flock. Without accurate production

records, it would be extremely hard to determine which ewes were the high or low producers. This information was taken from the production records of a flock containing 105 ewes. Male lambs were castrated at 10 days of age and all lambs were weaned at 90 days of age.

Table 2. — Daily Gains From 0 to 90 Days (Weaning)
for Fast- and Slow-Gaining Lambs

Single lambs		Twin lambs	
High	Low	High	Low
.81	.35	.73	.22
.80	.38	.70	.31
.79	.42	.70	.32

Table 3. — Recommended Weight Adjustment Factors^a

	Age of dam (years)		
	3 to 6	2 or over 6	1
Ewe lamb			
Single.....	1.00	1.09	1.22
Twin—raised as twin.....	1.11	1.20	1.33
Twin—raised as single.....	1.05	1.14	1.28
Triplet—raised as triplet.....	1.22	1.33	1.46
Triplet—raised as twin.....	1.17	1.28	1.42
Triplet—raised as single.....	1.11	1.21	1.36
Wether			
Single.....	.97	1.06	1.19
Twin—raised as twin.....	1.08	1.17	1.30
Twin—raised as single.....	1.02	1.11	1.25
Triplet—raised as triplet.....	1.19	1.30	1.43
Triplet—raised as twin.....	1.14	1.25	1.39
Triplet—raised as single.....	1.08	1.18	1.33
Ram lamb			
Single.....	.89	.98	1.11
Twin—raised as twin.....	1.00	1.09	1.22
Twin—raised as single.....	.94	1.03	1.17
Triplet—raised as triplet.....	1.11	1.22	1.35
Triplet—raised as twin.....	1.06	1.17	1.31
Triplet—raised as single.....	1.00	1.10	1.25

^a Multiply the 90-day weight by the appropriate adjustment factor. For example, a three-year-old ewe raises twins with the ram lamb weighing 80 pounds at 90 days and the ewe lamb weighing 70 pounds at 90 days. To determine the 90-day adjusted weight of the ram lamb, multiply 80 times 1 (80 pounds). For the ewe lamb, multiply 70 times 1.11 (77.7 pounds). Remember that all weights are adjusted on the basis of a single ewe lamb from a mature ewe.

Source: 1968 National Sheep Extension Committee Report, "Recommendations for Uniform Sheep Selection Programs."

Without some sort of production records it is difficult to determine if progress is being made in flock improvement. Such factors as weaning weights, fleece weights, lambing percentage, and percentage of death loss have a direct effect on income and profit from the enterprise.

Copies of two production record forms are shown on pages 15 and 16. Example records have been placed on these forms for illustrative purposes. The forms, as well as copies of Tables 3 and 4, are available from the Livestock Extension Office, 326 Mumford Hall, Urbana, Illinois 61801. Information about the computerized Ohio Sheep Production Testing Program, in which some Illinois flocks are enrolled, is also available from this office.

Table 4. — Age in Days Tabulation Chart^{a, b}

Day of month	Month											
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1	1	31	62	93	121	152	182	213	243	274	305	335
2	2	32	63	94	122	153	183	214	244	275	306	336
3	3	33	64	95	123	154	184	215	245	276	307	337
4	4	34	65	96	124	155	185	216	246	277	308	338
5	5	35	66	97	125	156	186	217	247	278	309	339
6	6	36	67	98	126	157	187	218	248	279	310	340
7	7	37	68	99	127	158	188	219	249	280	311	341
8	8	38	69	100	128	159	189	220	250	281	312	342
9	9	39	70	101	129	160	190	221	251	282	313	343
10	10	40	71	102	130	161	191	222	252	283	314	344
11	11	41	72	103	131	162	192	223	253	284	315	345
12	12	42	73	104	132	163	193	224	254	285	316	346
13	13	43	74	105	133	164	194	225	255	286	317	347
14	14	44	75	106	134	165	195	226	256	287	318	348
15	15	45	76	107	135	166	196	227	257	288	319	349
16	16	46	77	108	136	167	197	228	258	289	320	350
17	17	47	78	109	137	168	198	229	259	290	321	351
18	18	48	79	110	138	169	199	230	260	291	322	352
19	19	49	80	111	139	170	200	231	261	292	323	353
20	20	50	81	112	140	171	201	232	262	293	324	354
21	21	51	82	113	141	172	202	233	263	294	325	355
22	22	52	83	114	142	173	203	234	264	295	326	356
23	23	53	84	115	143	174	204	235	265	296	327	357
24	24	54	85	116	144	175	205	236	266	297	328	358
25	25	55	86	117	145	176	206	237	267	298	329	359
26	26	56	87	118	146	177	207	238	268	299	330	360
27	27	57	88	119	147	178	208	239	269	300	331	361
28	28	58	89	120	148	179	209	240	270	301	332	362
29	29	59	90	(^b)	149	180	210	241	271	302	333	363
30	30	60	91	...	150	181	211	242	272	303	334	364
31	...	61	92	...	151	...	212	...	273	304	...	365

^a For example, assume that a lamb is born on February 1 and weighed on May 12. Use the day-of-month column to find the first day under February; the figure found is 93. Do the same for May 12; this figure is 193. Subtract the two, 193 minus 93, for the age of the lamb in days. The result is 100 days.

^b In leap years, for a lamb born after February 28 add 1 day to the tabulated number.

B A R N R E C O R D

OWNER

John Doe

ADDRESS

Urbana

YEAR 1920

[illegible]

EVALUATING SIRE PERFORMANCE

Records indicate that there is a great deal of variability in sire performance within each breed and within many flocks. This means that you should evaluate sire performance as well as individual ewe performance. The following guidelines will be helpful in making this evaluation:

1. Percent of exposed ewes that actually lamb.
2. Percent of ewes that settle during the first two cycles.
3. Percent of lamb crop born, based on ewes exposed.
4. Percent of lamb crop born, based on ewes lambing.
5. Percent of lamb crop weaned, based on ewes exposed.
6. Percent of lamb crop weaned, based on ewes lambing.
7. Average 90-day adjusted weight of weaned lambs.
8. Complete carcass evaluation for at least five lambs per sire and preferably 10.

BREEDING SEASON CONSIDERATIONS

Lambing Season

One of the major decisions a flock owner needs to make is whether to plan an early-lambing program (late December to early March) or a late-lambing program (starting in late March). Early lambing has these advantages: lambs usually are sold on a higher market; lambs will gain more rapidly; hot weather and internal parasites do not pose a major problem; lambs can be sold without putting them on pasture; and labor requirements for lambing come at a slack time of the year.

Late lambing has the following advantages: building and equipment requirements are less; feed costs per ewe are lower; and lambs can make maximum use of pasture forage and can be marketed directly from pasture with a minimum amount of grain feeding.

In recent years there has been increased interest in fall lambing (September 1 to December 1) and also in accelerated lambing. The advantages of fall lambing are: favorable weather; better use of equipment; lower feed and labor requirements; good prices for lambs; and the possibility for accelerated lambing. Disadvantages are: a higher percentage of ewes fail to lamb; smaller birth weights; lower lambing percentages; and at times poorer-milking ewes.

Accelerated Lambing

Two relatively new management practices are currently being developed by some sheepmen. These are accelerated lambing (three lamb crops

in two years) and synchronized breeding and lambing (grouping lambings into three-to-seven-day intervals). Most sheepmen who practice accelerated lambing combine synchronization with it.

Accelerated lambing is a must for those who go to a drylot or semi-confinement type of operation. Certain breeds are more adapted to fall lambing, and therefore accelerated lambing, than others. Sheep of Rambouillet and Dorset breeding seem to have the lead in this respect. Many Hampshire and Corriedale flocks also have quite a few fall lambs.

In order to lamb every eight months, the lambs must be weaned at 60 days or less, thus leaving 30 days in which to rebreed the ewe. Controlling the estrous cycle of a ewe or stimulating the ewe to cycle during the anestrus period begins with progesterone hormone treatments for a period of approximately 14 days. Feed additives, vaginal tampons, and silastic implants impregnated with progesterone or progesterone-like substances are available for this purpose. Withdrawal of these progesterone sources during the normal breeding season will result in a large percentage of the ewes coming into heat within one to three days following withdrawal. During the anestrus period, the progesterone treatment should be followed by an additional hormone treatment to insure follicular development and subsequent ovulation. Pregnant mare's serum (PMS), which contains follicle-stimulating hormones, is often used for this purpose.



This highly productive Rambouillet ewe has been on an accelerated lambing program and has given birth to and weaned 20 lambs in 9 successive lambings (7 sets of twins and 2 sets of triplets).

A successful accelerated lambing program requires careful management. Many of the problems encountered with accelerated lambing may center around the low fertility of many rams in the spring and early summer. Also, when ewes are synchronized, there is generally a need for more rams than would be required for a conventional pasture mating system.

Flushing the Ewes

Feeding a ewe so it rapidly improves in condition from ten days to two weeks before breeding (commonly known as flushing) may increase the lambing percentage by 10 to 20 percent. However, this increase will not occur if ewes are already in a high condition prior to breeding. Ewes that become too fat may not breed at all. To flush ewes, let them graze better pasture or feed them $\frac{1}{2}$ to $\frac{3}{4}$ pound of corn or oats, or a mixture of the two, per head per day. Use some caution when flushing ewes by turning them onto lush legume pastures. During years of heavy rainfall, such pastures often contain a high level of coumestrol (a plant estrogen) that can cause delayed conception.

Tagging the Ewes

All ewes that are in long fleece or have a lot of manure around the rear end should be tagged before the ram is turned in. Tagging means trimming the wool around the dock area so it will be easier for the ram to do a good job of getting the ewes settled.

Effect of the Ram on Ewe Fertility

Research reports indicate that some rams consistently sire more multiple births than other rams, although formerly the ram was considered to have no effect on lambing percentage.

A report given at the 1964 Ohio Sheep Day summarized two years of work in which 49 Columbia and Targhee rams had been placed with six to eight Columbia and Targhee ewes in individual breeding pens for a period of 51 days. When statistically analyzed, the lambing data showed that the ram did exert a highly significant influence on the reproductive performance of the ewes to which he was exposed. Table 5 shows the average for the nine rams whose female mates had a high level of reproductive performance and for the seven rams whose mates had a low level of performance.

An Idaho report indicates that over a six-year period one particular ram sired an average of 32.8 percent more single lambs each year than did other rams used in the same flock.

Table 5. — Average Performance of High-Fertility and Low-Fertility Rams as Determined by Ewe Production

Rams	Number of lambs born per ewe exposed	Number of lambs born per ewe lambing	Number of live lambs at 10 days per ewe lambing
High fertility.....	1.54	1.79	1.72
Low fertility.....	.67	1.17	.99
Difference.....	.87	.62	.73

Source: 1964 Ohio Sheep Day Report. Ohio Agr. Res. and Dev. Center Animal Science Series No. 132. Wooster, Ohio, 1964.

Data from the Dixon Springs Agricultural Center also indicate that there is a great difference in ram breeding performance. A study of the breeding data for 23 rams shows that some rams settled only 25 percent or less of the ewes during the first two heat periods. Other rams, however, settled over 90 percent of the ewes during the first two heat periods.

Ram Management and Breeding Records

Shear your rams six to eight weeks before the breeding season if you expect maximum breeding results. Rams in long fleece during hot weather may become infertile because of high body temperature, and it may take approximately six weeks or longer for them to regain their fertility. Some flock owners have improved breeding performance and their lamb crops by turning rams in with the ewes only at night, and then keeping the rams in cool quarters during the day.

New rams should not be turned in with the ewes immediately upon arrival at the farm, but should be allowed at least one or two weeks to become familiar with their new environment. The same is also true of show rams. Gradually lower the condition of these rams and give them plenty of exercise for several weeks before you turn them in with the ewes.

It is advisable to use some system of marking so you will know when the ewes are bred and whether the ram is doing an effective job. A marking harness with crayons can be used for the ram or his brisket can be smeared with a marking pigment. In either case, whenever a ewe is bred her rump will be marked. Change the marking crayons or the brisket smear pigments every 17 days. For the smear pigment, you can use yellow ochre and old crankcase oil, venetian red and crankcase oil, or lamp black. Apply it to the brisket every second or third day.

It will be easier to keep an accurate breeding record if you paint-brand the ewes. Use any good scourable paint-branding fluid. The ewes



The use of a marking harness is a very satisfactory means of determining when the ewes are being bred and whether or not the ram is doing an effective job of breeding. Notice the proper position of the harness as shown here and the fact that the ram has been shorn prior to the breeding season.

can be paint-branded in several places such as the side, back, or shoulder, however the back is most commonly used. In this way when a ewe is marked by the ram she can be easily and quickly identified.

Effect of Temperature on Embryonic Mortality

Extremely hot weather at breeding time can cause increased embryonic mortality. Sheep need trees, a shed, or some other artificial shelter so they can get out of the sun and keep as cool as possible. Ewes or rams that have heavy fleeces or are in high condition may have an increase in body temperature when the air temperature is high. Under stress conditions fertility is impaired and an increase in loss of early embryos results.

FEEDING THE EWE FLOCK

When you develop a feeding program for your ewe flock, take advantage of their ability to efficiently use large quantities of roughage and pasture. A sound feeding program should include maximum use of high-quality hay (legume or mixed), silage (corn, grass, or legume), or haylage. Two of the most critical periods of the year, so far as nutrition is concerned, are late pregnancy and early lactation. If a ewe is expected to deliver large, strong, healthy lambs and provide a heavy flow of milk, then adequate nutrition must be provided before and after lambing.

Trace-mineralized salt or a salt-mineral mixture should be fed free choice throughout the year. In areas where copper toxicity is a problem, use plain salt instead of trace-mineralized salt. Sheep should also have plenty of clean, fresh water available at all times. During cold weather, use water heaters to keep water from freezing and to insure adequate water intake.

Concentrate Mixtures

The concentrate mixture can be very simple. Make maximum use of home-grown grains. If a high-quality legume or mixed hay is fed then no protein supplement is needed during gestation or lactation. Corn, oats, and barley are excellent cereal grains for feeding sheep and the combination of any two or all three can make up the concentrate mixture. A commonly used mixture is a combination of half oats and half shelled corn. Sometimes bran is used to make up 10 percent of the mixture, primarily because of its laxative properties. When poor-quality roughage is fed, approximately 15 percent of the concentrate mixture should be a protein supplement (soybean meal, linseed meal, or a commercial protein supplement).

Feeding During Gestation

Whether you should give ewes supplemental feed during early pregnancy depends on the availability of feed in the form of pasture, stubble fields, and stalk fields. If the roughage supply in the fields is not adequate and the ewes are not gaining weight, then feed one or two pounds of legume hay per head per day.

Feed a concentrate ration during the last six weeks of pregnancy to provide an additional supply of energy to meet the demands of the rapidly developing fetus. About two-thirds of the birth weight of a developing fetus is gained during the last six weeks of pregnancy. It is usually thought that a ewe should gain from 20 to 30 pounds during pregnancy.

Inadequate nutrition during the last six weeks of pregnancy may result in the following:

1. A higher percentage of ewes with pregnancy disease.
2. A decrease in birth weights.
3. Weaker lambs at birth.
4. An increase in infant lamb mortality.
5. Slower gaining lambs.
6. Lower milk yields during lactation.

During the last six weeks of pregnancy, feed from ½ to 1 pound of a concentrate ration and 3½ to 4 pounds of legume or mixed hay per head per day. The exact amount to feed depends on the weight and condition of the ewes. Silage can be substituted for hay at the approximate rate of 2 to 3 pounds of silage for each 1 pound of hay replaced, depending of course on the moisture content of the silage. Keep in mind that corn silage is low in protein and calcium, so a protein-mineral supplement must be added unless half of your roughage is legume hay.

Wisconsin studies show that ewes which ate 8 pounds daily of grass silage (50 percent moisture content) during late gestation and 12 pounds daily in early lactation produced as well as ewes that received 5 pounds of legume hay and 1 pound of grain daily through both periods.

Even fall-lambing ewes that are on good pasture should receive from ½ to 1 pound of grain during at least the last four weeks of pregnancy.

The information in Table 6 will serve as a guide in determining how much feed your ewes will need in late pregnancy and early lactation. Notice that several different roughages are listed in combination with an equal-parts grain mixture of corn and oats. Remember that the amounts of feed listed in Table 6 are for ewes weighing approximately 160 pounds in late pregnancy and 140 pounds during early lactation.

Table 6. — Daily Feed Required to Meet NRC Requirements When a 50-50 Mixture of Corn and Oats and Various Roughages are Used^a

Feed materials	Late pregnancy (160-lb. ewe)	Early lactation (140-lb. ewe)
	<i>lb.</i>	<i>lb.</i>
Alfalfa hay	4.0	4.0
Grain mixture . . . . .	.75	1.5
Clover-timothy hay (50-50)	4.0	4.0
Grain mixture . . . . .	.75	1.5
Orchardgrass hay	4.0	5.0
Grain mixture	1.0	1.5
Alfalfa silage (30 percent dry matter)	7.5	7.5
Alfalfa hay	1.0	1.5
Grain mixture	1.0	1.5
Corn silage (29 percent dry matter)	7.5	8.0
Alfalfa hay	1.0	1.0
Soybean meal . . . . .	.25	.25
Grain mixture . . . . .	.50	1.25
Alfalfa haylage (60 percent dry matter)	6.0	6.0
Grain mixture . . . . .	.5	1.5

^a Assuming that trace-mineralized salt or a salt-mineral mixture is fed free choice.

Self-Feeding Brood Ewes

In recent years, there has been increased interest in self-feeding complete ground mixed rations to pregnant and lactating ewes. One of the major problems in self-feeding has been to keep ewes from becoming too fat. However, research at the University of Illinois indicates that ewes can be satisfactorily self-fed. Two main advantages of self-feeding a ground mixed ration are reduced labor in feeding and use of lower-quality roughages. A high percentage of roughage is used in self-fed rations.

Table 7 gives two self-fed rations that have given satisfactory results in studies at the University of Illinois.

A self-fed ration has been used successfully at the Dixon Springs Agricultural Center. This ration consisted of 34 percent ground ear corn and 66 percent ground grass-legume hay. Self-feeding this ration can begin a month before lambing and should extend for no more than 60 days after lambing. If you have a large number of multiple births, ground shelled corn can be substituted for ground ear corn.

Consumption of a self-fed ration can be controlled by limiting the time the ewes have access to the self-feeders.

Researchers in Minnesota have reported satisfactory results from feeding ewes three times a week. This practice would appear to be very practical during early gestation and following weaning. However, extreme caution should be used in trying to follow this program during late gestation and early lactation.

Use of Antibiotics in Ewe Rations

If you have been having a high lamb mortality rate, then you may be interested in the results of a three-year (1964-1966) South Dakota

Table 7. — Two Satisfactory Rations for Self-Feeding Ewes

Ingredients	Corncob ration			Oat hay ration		
	Early ges- tation	Late ges- tation	Lac- tation	Early ges- tation	Late ges- tation	Lac- tation
	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>
Corncobs, ground	70	65	60	...	...	...
Oat hay, ground ^a. . . . .	...	...	...	80	75	70
Alfalfa meal.	5	5	5	5	5	5
Corn, ground.	10	15	20	10	15	20
Soybean meal.	15	15	15	5	5	5
Steamed bone meal.	1	1	1	1	1	1
Salt, trace-mineralized	1	.5	.5	1	.5	.5

^a Medium- to low-quality hay can be used in a similar manner as the oat hay.

study in which 531 western ewes of mixed breeding were used to evaluate the influence of antibiotic supplementation to pregnant ewes on lamb livability and performance.

Supplementing pregnant ewes with 60 mg. of Aureomycin per head daily for 80 days starting six weeks before lambing substantially reduced lamb mortality. Average lamb mortality rate for the three-year period was 3.9 percent in the Aureomycin-supplemented group compared with 14.5 percent in the control group. The antibiotic treatment did not influence weight change of the ewes or lamb gains from birth to weaning.

Feeding During Lactation

Lactation places a greater demand on the ewe than pregnancy, and increases the level of nutrients needed. A 140-pound ewe in early lactation needs about 70 percent more protein than in early pregnancy, and she needs 19 percent more protein than in late pregnancy (at which time the ewe would weigh about 160 pounds). The total daily nutrient requirements (TDN) are increased by approximately 82 and 24 percent, respectively. After about 60 to 70 days of lactation, the nutrient requirements are less because of declining milk production, so the amount of concentrate fed can be decreased at this time.

During the first 60 to 70 days of the lactation period, continue to feed 3½ to 4 pounds of high-quality legume or mixed hay, but increase the



Note the thrifty condition of these fall-born lambs, indicating that the ewes are good milkers and have been well fed.

amount of concentrates up to 1½ to 2 pounds per head per day. Keep in mind that the actual amount depends on the weight and condition of the ewes. Small ewes require less than the recommended amounts and very large ewes require more. Separate ewes that are nursing more than one lamb and feed them an additional ½ pound of concentrate mixture. Keep in mind that the feeding value of 2 to 3 pounds of silage is about the same as 1 pound of hay. By the time lambs are between one and two months of age, they will be eating quite a bit of the ewes' feed, and you must keep this in mind to adequately meet the ewes' requirements.

After the first 60 to 70 days of the lactation period feed the ewes the same ration you fed them during late pregnancy — 3½ to 4 pounds of legume or mixed hay and ½ to 1 pound of a concentrate mixture. Additional feed at this time will only allow the ewes to put on excess fat and will increase the cost of production.

As soon as the ewes can be turned out to pasture full time, no additional roughage or grain is needed as long as there is sufficient pasture.

To be a good shepherd you must use your eyes, your hands, and a scale, if one is available, to find out how the ewes are doing in relation to changes in weight and condition. By keeping up to date on the changes in your flock, you can alter your feeding program accordingly.

ewe management during gestation

Exercise

Pregnant ewes should have plenty of exercise. Some flock owners feed hay or grain some distance from the barn so the ewes will be forced to exercise. The last month of pregnancy may present the most problems. Ewes that are extremely fat or that are carrying twins or triplets may become very sluggish. Watch them carefully and force them to exercise. Many of these ewes will eat less than they should and they are the ones that may develop pregnancy disease (pregnancy toxemia or ketosis).

Pregnancy Disease

Pregnancy disease commonly occurs a few weeks before lambing. Most of the affected ewes are carrying twins or triplets. The disease is related to the metabolism of carbohydrates late in pregnancy. Because of the large amount of abdominal space occupied by the rapidly developing fetus, the ewe may have difficulty eating enough to supply her own needs and those of the unborn lambs, especially if only roughage is fed.

In the early stages of the disease the ewes are less active than the rest of the flock and walk very slowly. Later they become weaker, walk stiffly,

have difficulty rising, and may stand with their heads against some object. As the disease progresses, they cannot rise and they lie with their heads turned to the side. Other symptoms are rapid breathing, blindness, and grinding of the teeth. In advanced stages the breath may have a characteristic sweetish odor that helps to identify this disease. If affected ewes are not treated as soon as the disease is noticed, a high percentage of them will die unless lambing is only a few days away. They will generally recover after lambing if their condition is not critical at lambing time.

Ewes with pregnancy disease should be treated when they are in the early stages of the disease for most effective treatment. You can use several treatments, such as drenching the ewes with (1) 3 to 4 ounces of glycerol or propylene glycol twice daily, (2) $\frac{1}{2}$ pint of molasses twice daily, or (3) $\frac{1}{2}$ pint of a 25- to 50-percent fructose solution twice daily.

Preparing the Lambing Quarters

Sheep do not need elaborate or expensive housing and equipment. Whether you are following an early- or late-lambing program will determine how tight and free from drafts the building should be. Lambing pens (4 feet by 4 feet or 4 feet by 5 feet) should be set up before the lambing season in a draft-free area of the barn. Even though the average length of gestation is 147 to 148 days, some ewes may lamb a week early, so it pays to be prepared.



These lambing pens are clean and well bedded with water available for the ewes. The ewes have been paint-branded for easy identification.

Shearing Before or After Lambing

Many flock owners shear their ewes several weeks before lambing, and this practice has several advantages:

1. It eliminates the need for crutching.
2. It is easier for lambs to nurse and is more sanitary.
3. Fleeces contain less dirt and manure.
4. More ewes can be put into a limited space.
5. It is easier to spot ewes that are close to lambing and those with udder problems.
6. The barn is dryer and less bedding is needed.

There are also several disadvantages:

1. A good, warm building is needed.
2. Fleeces will not have as much grease weight.
3. Sheep are harder to shear in cold weather.
4. If ewes are sheared too near lambing time and are handled roughly, some lambs may be born prematurely.

Crutching

If you do not shear ewes before they lamb, at least crutch them out. Crutching means to shear around the udder, between the legs, and around the dock. If there is extensive wool covering on the face, it would be a good idea to shear the head also.

ewe management during lambing and lactation

Lambing time is a very critical period of the year, because at this time you can “make or break” the future productivity of your flock. The higher the percentage of lambs born alive and reared to marketing time, the greater the gross returns from the enterprise.

Lambing Time Suggestions

1. Watch ewes closely and give assistance if needed.
2. When a ewe has difficulty, find out whether the lamb is being delivered in normal position (head between and slightly above the front feet). If not, proceed cautiously. Difficult lambing may be caused by any of the following conditions:
 - a. The lamb is extra large, especially its head and shoulders.
 - b. The ewe has small pelvic area.

- c. The ewe fails to dilate.
 - d. The lamb comes backwards (breech birth).
 - e. One or both front legs are bent back.
 - f. The head is bent back.
 - g. The lamb comes hocks first.
 - h. If the ewe is carrying two lambs, their legs may become tangled; or, if the two lambs are side by side, the ewe may try to deliver both at the same time.
3. Just before or after the ewe lambs, place her in a lambing pen.
 4. Check the udder to see if colostrum is available, and check the teats to be sure they are open.
 5. Be sure the ewe owns her lambs and allows them to nurse before you leave.
 6. If lambs are weak, help them nurse.
 7. If it is extremely cold, provide a heat lamp for each lambing pen.
 8. Ear-tag lambs and record information on your barn records.
 9. You can remove ewes with healthy single lambs from lambing pens after one day, and ewes with healthy twins after two days.

Value of Colostrum

The first milk the ewe produces after lambing is called colostrum. It differs a great deal in chemical composition and biological properties from the milk secreted several days after lambing. It is highly essential for lambs to get some colostrum as soon as possible after birth, because it provides energy, protein, vitamins, and minerals, as well as antibodies that help them resist infection. For example, lambs are born with a low level of vitamin A. Colostrum is rich in vitamin A and is essential to build up lambs' vitamin A reserves. Ohio studies indicate that ewes delivering twins have approximately 46 percent more vitamin A in their colostrum than ewes delivering singles.

Some flock owners freeze the colostrum from ewes that deliver dead lambs or those that lose their lambs. They then use it for orphan lambs or lambs from ewes that have no colostrum available soon after lambing.

Udder Problems

The need to keep the ewe's udder working well cannot be overemphasized, because milk is the lamb's main food for at least the first 30 days. There is a close relationship between milk yield and lamb growth and development, especially during the first part of the lactation period. The capacity of the offspring to consume milk is one of the principal factors

that govern the amount of milk produced by the dam. Ewes with twins produce about 50 percent more milk than comparable ewes with singles.

Observe ewes and lambs carefully throughout the lactation period to detect sickness or other disorders before they become major problems. One of the potential trouble spots is the udder. If it becomes injured or infected and the condition is not treated early, the ewe may lose the milk-producing ability of one or both sides of the udder.

Mastitis can become a serious problem and may even cause death. One form is very toxic and, if not treated at once, ewes may die within two or three days after the infection starts. When a case of mastitis occurs, isolate the ewe and her lambs from the rest of the flock until the infection is under control. Udder infections can be spread when lambs that belong to infected ewes nurse other ewes. Lambs can also injure the udder with their sharp teeth. If these injuries are not treated early, they may become so painful when the lambs nurse that the ewe will automatically wean them. Udder sores provide excellent avenues for harmful bacteria to enter the body. Keeping the barn well bedded will help cut down udder problems.

Helping Ewes Own Their Lambs

Persuading a ewe to claim her lamb or lambs can sometimes be a real headache. This is generally more of a problem with ewes lambing for the first time than it is with older ewes. If you have trouble with a ewe two years in a row, it would be best to sell her.

There is no clear-cut answer to why ewes fail to claim their offspring. Some of the situations that may cause a ewe to disown one or all of her lambs are:

1. A ewe may deliver one lamb in one part of the barn and deliver a second lamb in another part of the barn.
2. One of a set of twins may wander away from its mother before she has fully recovered from delivery.
3. The ewe may have a very painful udder caused by swelling, caking, or infection.
4. The teats may be cut or chapped, causing the ewe a great deal of discomfort.
5. A ewe that has been in labor for a long period of time may not be interested in her lamb for quite a while after delivery.
6. Sometimes a ewe may run a high temperature for several days after lambing and not show much interest in her lambs.
7. Sometimes you may have problems with ewes that are very nervous and flighty.

8. Some young ewes lambing for the first time may be frightened by the lambs they have given birth to.

It takes a lot of patience to work effectively with a ewe that disowns her lamb. Keep in mind that it is much easier for the ewe to raise her lamb than for you to raise an orphan. There is no guaranteed method of getting a ewe to claim her offspring. But flock owners have reported satisfactory results with one or a combination of the following measures:

1. Tie the ewe in the pen until she allows the lamb to nurse.
2. Put a dog near the pen with the ewe and lamb.
3. Rub the ewe's nose and the lamb with some of the ewe's milk or with kerosene or oil.
4. Household deodorizer sprays may be sprayed on the lamb and on the ewe's nose.
5. Blindfolding the ewe is also helpful at times.

FEEDING AND MANAGEMENT OF LAMBS

Lamb Mortality

Lamb survival and performance determine to a large extent how profitable a sheep enterprise will be. Lamb mortality studies show that 50 to 70 percent of lamb death losses occur in the first three to five days after birth, and 80 to 90 percent occur during the first month. These figures indicate that it is extremely important for each lamb to get a good start and that the first few days are critical ones. These studies also show that the four main causes of lamb losses have been weak lambs, starvation, stillbirths, and pneumonia. Male lambs are reported to have a higher mortality rate than females, and twins have a higher mortality rate than singles. In many flocks a higher death loss occurs among lambs born in the second half of the lambing season.

Disinfecting the Navel

It is a good practice to disinfect the navel cord of all lambs soon after birth with tincture of iodine or another good antiseptic to prevent navel ill (joint disease), which is caused by bacterial infection. The disease causes a stiffness and swelling of the joints of the legs. Sometimes the navel area also becomes infected.

Inverted Eyelids

If not corrected, inverted eyelids (entropion) can lead to total blindness. Sometimes lambs have this condition at birth; others may not be

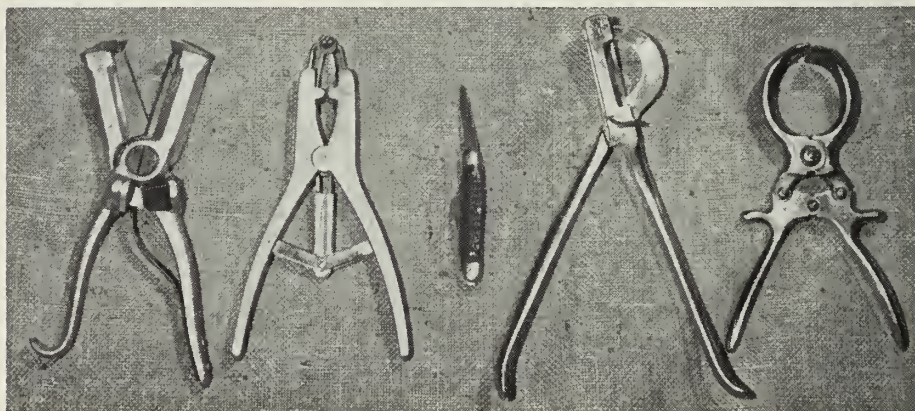
affected until they are one or two weeks old. Unless it is severe it can usually be corrected by catching the lamb several times a day and working the eyelid outward. Use an eye ointment or powder to help eliminate infection caused by irritation. If the condition is severe and does not respond to this treatment, try one of these remedies: use adhesive tape to hold the eyelid in place for several days; use metal clips (surgical type) to hold the eyelid back; or clamp the excess fold of skin below the eyelash with a small burdizzo to hold the eyelid in proper position. This is an heritable trait that should be discriminated against in the selection of breeding stock.

Docking

Lambs should be docked between 3 and 10 days of age. Several pieces of equipment can be used for this job including a pocketknife, burdizzo (emasculatome), elastrator (rubber rings), emasculator, and "all-in-one." Cut off the tail 1 to 1½ inches from the body. A good place is the junction or end of the caudal folds on the underside of the tail. Try to push the skin on the tail toward the body before cutting to allow enough loose skin to cover the stub and not expose the bone. Docking gives lambs a better appearance and decreases the chances of maggot infestation. Leaving tails on ewes can pose problems at breeding time and at lambing.

Castration

All male lambs that are to be marketed should be castrated before they are two weeks old. Normally wether lambs will not gain as fast as



The above equipment can be used for castrating and docking. From left to right is the "all-in-one," elastrator (rubber rings), pocket knife, emasculator, and burdizzo (emasculatome).

ram lambs, and ram lambs are usually not discounted in price until after mid-May or early June. However, one of the major problems with ram lambs is that they continually pester the rest of the sheep and may settle some of the ewes if left with them too long (5 or 6 months), so it is best to castrate them. Wether lambs also usually have higher carcass grades and dressing percentages than ram lambs. Castration can be done with an elastrator, pocketknife, burdizzo, or “all-in-one.”

Creep Feeding the Lambs

Creep feeding is a means of providing supplemental feed for the lambs during the nursing period. It is usually more advantageous with an early-lambing program than with a late-lambing program. Advantages of creep feeding are: (1) it increases gains, especially for lambs from multiple births; (2) the lambs use supplemental feed more efficiently at this time than after weaning; (3) you can market lambs at a younger age; (4) earlier marketing usually means higher prices for lambs born early in the lambing period; and (5) creep feeding early lambs allows you to sell them without putting them on pasture, thus permitting more ewes to be carried on available pasture and reducing internal parasite problems.

Lambs will begin to nibble at grain and hay when they are about a week old. However, they will not eat much supplemental feed until they



Here is an excellent creep that has been kept clean and well bedded. It provides grain, hay, and water and has a light which helps to attract lambs into the creep.

are about four weeks old. Set up the creep when the lambs are 7 to 10 days old, and put it in a convenient location close to the brood flock. Provide water in the creep or as close to it as possible. A heat lamp placed over the feeder will help attract the lambs, especially at night. Sunlight shining into a creep during the day will also attract the lambs. The creep area should be kept well bedded and the feeders should be kept clean.

Make maximum use of home-grown grains and roughage when formulating the creep ration. Corn and oats as well as leafy, high-quality legume hay make excellent feed for young lambs. Barley can also be used, but may not be quite as palatable as corn and oats for the first couple of weeks.

Until the lambs are 6 weeks old the grain used in the creep ration should be cracked, crimped, or rolled unless a pelleted ration is used. After the lambs are six weeks old whole grain can be used unless it is extremely hard, and then the grain should be cracked, crimped, or rolled for several more weeks.

Although rolled oats are often too expensive to use, they are excellent in the creep ration or as a starter for lambs. Molasses is sometimes used in the creep ration, primarily as an appetizer or to hold down dust. If molasses is to be used it should make up 5 to 10 percent of the ration. Bran can also be included, making up 10 to 15 percent of the ration. Many people include bran in the creep ration because of its high palatability and laxative properties.

The creep ration should contain 15 to 16 percent crude protein while rations for early-weaned lambs (60 days or less) should contain about 18 percent crude protein. High-quality legume hay may be self-fed in either the long or pelleted form in addition to the concentrate mixture.

Two common creep rations are (1) 35 percent shelled corn, 35 percent oats, 15 percent bran, and 15 percent soybean oil meal (50 percent crude protein), and (2) 45 percent shelled corn, 40 percent oats, and 15 percent soybean meal (50 percent crude protein). Linseed meal or other protein supplements can be used in place of soybean meal as long as you balance the ration to contain the desired protein level. If you plan to use a high-urea supplement, it would be best to do so after weaning rather than before weaning. In addition, the protein supplement with urea should be introduced gradually for best results. Many people are using complete pelleted rations for creep feeding. For maximum performance, have no more than 30 percent roughage in the complete pelleted ration.

A high-protein (17.3 percent) creep ration that has been used successfully at the Dixon Springs Agricultural Center consists of 25 percent ground hay (grass-legume mixture), 53.5 percent ground shelled corn, 19

percent soybean meal (50 percent crude protein), 1 percent bone meal, 1 percent limestone, and 0.5 percent trace-mineralized salt. In addition, the ration is fortified with 1,000 I.U. of Vitamin A, 400 I.U. of Vitamin D₃, 40 I.U. of Vitamin E, and 10 mg. of terramycin per pound of ration. If you want to use a similar ration, but with a lower protein content, reduce the soybean meal to 14 percent and increase the ground shelled corn to 58.5 percent. This will lower the crude protein content to approximately 15.3 percent.

It is usually recommended that antibiotics be included in the creep ration at the rate of 15 to 20 grams per ton, which is the equivalent of 7.5 to 10 milligrams per pound of feed. Aureomycin (chlortetracycline) and terramycin (oxytetracycline) are the two most commonly used antibiotics in creep rations. Most studies have shown the following good results from the use of antibiotics: increased gains, improved feed efficiency, reduced scouring, lower death losses, and a more uniform group of lambs.

Creep rations do not have to be complex to be good. Research work in various states has indicated that lambs will perform as well on simple creep rations as they will on complex rations. However, there are times when a variety of ingredients or a change in ingredients may be needed if lambs go off feed. This is not as big a problem with lambs on creep feed as it is with weaned lambs.

Creep rations can be hand-fed or self-fed. Many sheepmen hand-feed until the lambs begin to eat regularly from the creep, and self-feed from then until weaning or marketing. The creep feeder must be kept clean at all times to get the largest consumption of the ration.

Raising an Orphan Lamb

One thing that helps get a lamb off to a good start is to make certain it gets some colostrum either from its mother or another ewe that has lambed about the same time. If a ewe loses her lamb within a day of birth, milk her out, freeze the colostrum, and use it when needed.

If you use cow's milk for the lamb, add one ounce of corn syrup to each pint of whole milk. Diluted or skimmed cow's milk should not be used since ewe's milk is normally much richer than cow's milk (ewe's milk is higher in fat and total solids). Good commercial milk replacers work well; however, they should be made slightly more concentrated than recommended for calves. Milk replacers designed specifically for sheep are currently available. Evaporated milk, when partially diluted, often gives good results.

Giving the orphan lamb supplemental vitamin A in either the oral or injectable form may also help get him off to a faster start. A single dose

of no less than 25,000 international units (I.U.) of vitamin A per lamb should be adequate. If the lamb received plenty of colostrum then the vitamin A supplement might not be necessary.

Feed orphan lambs 1 to 2 ounces of milk every two or three hours from early morning until late evening for the first few days. Gradually increase the volume of milk per feeding and the length of time between feedings. After about two weeks feed only three or four times daily.

A regular medicine bottle with a standard-size nipple works well for feeding the lamb during the first few days. As the lamb grows older a pop bottle with a standard-size nipple will be satisfactory. If quite a few pet lambs are to be fed, then a multiple lamb feeder, either commercial or home-made, would be better.

Recent studies at the USDA Experiment Station at Beltsville, Maryland, the Dixon Springs Agricultural Center, and other experiment stations indicate that orphan lambs can be fed milk cold instead of warming the milk. However, lambs may be started on a bottle more easily if the milk is warmed for at least the first few days.

Provide the lambs with a creep ration when they are 7 to 10 days of age. The sooner the lambs begin to eat supplemental feed the faster they will grow. Soybean meal has been found to be an excellent feed for very young lambs.

Individual Performance Differences

The period of greatest performance difference between single lambs and lambs of multiple birth is within the first 30 days, when the lambs are relying primarily on the ewe for their source of food. As lambs begin to eat supplemental feed the differences in gain decrease, and somewhere between 60 and 90 days of age twins usually catch up with singles in rate of gain. The data in Table 8 help point out this tendency. Wether lambs usually gain at about the same rate as ewe lambs from birth to 90 days of age, but ram lambs normally gain from 5 to 10 pounds more during the same period.

**Table 8. — Performance Differences for Lambs
in Five Age Groups**

Item	No. lambs	Average daily gain (lb.) by period				
		0-10	10-30	30-60	60-90	0-90
All lambs	72	.372	.521	.642	.693	.602
Singles	27	.464	.590	.714	.719	.659
Twins raised single	11	.387	.519	.565	.691	.579
Twins raised twins	34	.265	.455	.647	.688	.568

“In-and-Out” System of Lamb Management

If lambs are not sold before going to pasture, the “in-and-out” system of lamb management may be practical. There are several alternative procedures in this system:

1. Keep ewes and lambs together in drylot at night, but place them on separate pastures during the day.
2. Keep ewes and lambs together in drylot during the day, but place them on separate pastures at night.
3. Keep ewes and lambs together in drylot at night, place ewes on pasture during the day, and keep lambs in the barn on creep feeders.
4. Keep ewes and lambs together in drylot during the day, place ewes on pasture at night, and keep lambs in the barn on creep feeders.

The “in-and-out” system tends to cut down internal parasite problems and improves lamb performance during the pasture season.

Weaning

The proper age to wean lambs depends primarily on the system of management followed. These factors influence the age at which lambs are weaned: when the lambs are born (early or late); percentage of multiple births; creep feeding; availability of grain or pasture; parasite problems; type of sheep raised; and market prices and price outlook.

Most lambs in the midwestern states are weaned between two and four months of age. Late lambs that reach market weight on pasture are usually weaned at an older age than early lambs that are creep-fed. In recent years there has been more interest in earlier weaning. One reason is that milk production usually reaches a peak three or four weeks after lambing and decreases thereafter. Three or four months after lambing most ewes will be producing very little milk and it would be more economical to wean the lambs and turn the ewes out to pasture or at least decrease their daily ration. Many flock owners now wean at 90 days of age or less with good results, and some research done on weaning at 30 to 60 days of age has had good results. Successful early weaning is dependent upon how well the lambs are eating supplemental feed (creep) at the time they are weaned.

MANAGEMENT ON PASTURE

Your sheep will get the most out of pastures if you do as follows:

1. Wait until pastures are ready before turning in the flock. Most forage should be 6 to 8 inches high before being grazed. Sorghum-

sudangrass hybrids should be approximately 18 inches high before being grazed.

2. Use a moderate stocking rate to prevent close grazing. Stocking rates will vary with pasture forage used, season, and fertility level. If pastures become short because of drouth or overstocking, wean the lambs.

3. If possible, rotate pastures at two- to three-week intervals. Clip pastures at the end of each grazing period to encourage new growth, retain legumes in the pasture mixture, and control weeds. Grazing with cattle will increase pasture yields.

4. Provide clean water and shade.

5. Fertilize and lime your pasture regularly for maximum forage production.

FEEDING THE STUD RAM

Even though there has been very little research work dealing with nutrition of the stud ram, some general recommendations can be made. The stud ram, like the brood ewe, requires adequate nutrition in order to perform efficiently. Poor nutrition can result in lowered fertility or even infertility, as well as loss of vigor and strength. For best results the ram should be in moderate condition at breeding time.

In the summer and just before the breeding season the ram can receive all of its nutrient requirements from pasture. If the ram begins to lose weight during the breeding season or if he is thin before the breeding season, he should receive from 1 to 1½ pounds per day of a concentrate mixture similar to that recommended for ewes. If a ram lamb is being used he should be fed more than this.

During the winter months feed the ram so that he gains some weight but does not become excessively fat. One pound of a concentrate mixture and 3½ to 4 pounds of legume or mixed hay should be enough for a 180-pound ram. Feed a 240- to 250-pound ram the same level of concentrate and 4½ to 5 pounds of hay per day. When silage is fed, substitute 2 to 3 pounds of silage for each pound of hay replaced.

PARASITE CONTROL

Failure to effectively control internal and external parasites can result in greatly decreased performances of ewes and lambs. Severe cases of parasitism often cause death. Good parasite control is one of the management practices that pays big dividends.

Internal Parasites

The most common internal parasite is the stomach worm. Tapeworms and lung worms are also found in many Illinois flocks. Therefore, parasite control programs are directed primarily toward the control of these three. Other internal parasites, such as smaller round worms, nodular worms, whip worms, and liver flukes, are occasionally reported. If you suspect your sheep have these internal parasites, your veterinarian can identify them and suggest proper treatment.

For the most effective control of internal parasites, drench the brood flock and replacement stock at least three or four times a year: once before turning sheep out to pasture in the spring; once or twice during the summer and early fall; and again when the sheep are brought into the barn for the winter. Lambs that are born early and are marketed without going to pasture will usually not need drenching. Those that are to go on pasture should be drenched regularly the same as the brood flock.

Don't use the same drench throughout the year, but alternate at least two different ones. If you use only one product the parasites that are not eliminated may become at least partly immune to it. Four common drenching materials are phenothiazine, phenothiazine-arsenate of lead, combination drench (copper sulfate-nicotine sulfate), and thiabendazole. In addition, there is a new drench called Loxon that you may want to evaluate.

Allow sheep free access to a phenothiazine-trace-mineralized salt mixture during the pasture season. Providing rotation pasture or rotating



This picture indicates the proper method of drenching. Note that the nose and jaws have been clamped shut.

sheep on permanent pasture is also an effective means of reducing internal parasite problems.

External Parasites

External parasites can be controlled best by following a yearly dipping program. Use a toxaphene solution or other dipping preparations recommended for livestock use and recognized by the USDA and the Illinois Department of Agriculture. Ticks, lice, and mites can be very detrimental to the performance of sheep of all ages, and especially detrimental to the quality and value of the wool produced.

Ticks are probably the most common external sheep parasites. They are brown, have six legs, are about $\frac{3}{16}$ to $\frac{1}{4}$ inch long, and can be easily seen when the fleece is parted. By sucking blood from the skin of sheep, ticks cause irritation, restlessness, rubbing, and loss of wool.

There are two kinds of sheep lice, the biting louse and the sucking louse. The more common is the red-headed biting louse. It is very small — seldom more than $\frac{1}{25}$ of an inch long — and looks much like a timothy seed. You can see lice either in the wool or on the skin. The damages to sheep are mainly an irritation of the skin which causes sheep to rub off their wool and an unthrifty condition caused by restlessness.

Four species of mites affect sheep: the psoroptic or scab mite, the chorioptic or foot scab mite, the sarcoptic or head scab mite, and the psorergates mite, which lives between the layers of skin. The psoroptic, commonly called sheep scab mite, causes the greatest damage to flocks. It is one of the most destructive external parasites and also one of the most difficult to control. This parasite is only $\frac{1}{50}$ of an inch long and burrows into the skin. The sheep rubs itself and pulls at the wool to relieve the irritation and itching. Hard scabs form in the affected areas and the sheep loses condition rapidly. Since sheep scab is such a highly infectious disease, treatment must be prompt and effective. Federal and state programs are under way to eliminate scabies from the United States.

Dipping should be done on a bright, sunny day if possible, but do not wait for the ideal day if scab has been diagnosed. Few farms have permanent dipping vats, but portable dipping vats are available throughout much of the state. If neither type is available, the sheep may be sprayed. Spraying calls for more material and is usually not so effective as dipping. Dusting is a difficult and dirty job and less effective than either dipping or spraying. The operator should wear a respirator for protection when he is dusting.

FOOT HEALTH

It is very important to keep the feet of all sheep well trimmed. Foot problems prevent sheep from performing at the highest level. These problems are much easier to prevent than to cure.

Suggestions for Foot Care

1. Trim the feet of all sheep twice a year. Use a sharp knife, pruning shears, or foot-rot shears.
2. Sell for slaughter all sheep that do not respond to treatment.
3. Isolate all new sheep until their feet have been carefully inspected and trimmed.
4. Do not allow sheep to travel through deep mud or manure.
5. Catch lame sheep and examine their feet as soon as you notice the lameness.
6. To minimize pasture contamination, isolate all sheep that have any type of foot infection.

Foot problems may be caused by foot rot, foot abscess, and foot scald; lack of timely and proper foot care; poor foot development caused by tissue abnormalities, nutrition, and genetics; injury from cinders, gravel, and plant stubbles; and lip and foot diseases, such as contagious ecthyma.



The picture on the left shows a sheep with one hoof that needs trimming and one that is properly trimmed. A commonly used foot trimmer is also shown. Note in the picture on the right how much better the sheep can stand on the hoof that has been properly trimmed.

Foot Rot¹

Foot rot affects sheep of all ages and lameness is usually the first symptom noticed. Animals that are not treated seldom recover readily and they remain carriers. The disease can spread rapidly through the flock, and one or more feet may become infected. The outer horny portion of the hoof frequently separates from the sole. The separation usually progresses from the heel to the toe. There is not a large amount of pus, but gray necrotic material separates the horny portion from the underlying flesh of the hoof. Foot rot is characterized by a strong odor of the affected tissue.

Foot Abscess¹

Foot abscess differs greatly from foot rot. The abscess frequently affects a single foot at a time and may even be limited to half of the foot. Generally there is no odor, or if there is odor, it is hard to define. In the early stages pressure on the claw causes pain. Later a boil-like abscess appears, with swelling, inflammation, and proud flesh which bleeds freely. Yellowish-green pus erupts at the coronet or higher up. Like a boil, it discharges gray or yellow necrotic material. The abscess usually heals with time and is not considered highly infectious or contagious. The germ is passed in the dung of the sheep.

Foot Scald¹

Foot scald is a mild irritation of the area between the sheep's toes. It occurs during wet weather and causes lameness. Foot scald can be controlled by clipping areas of the pastures where the sheep lie to reduce the incubation effect of the wet, warm pasture.

Footbath Solutions

If a footbath is needed, use a solution of 20 to 25 percent copper sulfate, 5 to 10 percent formalin, or 10 percent quaternary ammonia. Let sheep stand in a footbath for at least 3 to 4 minutes, and treat every second day for eight days. Follow a sound yearly foot-health program to minimize foot troubles.

LAMB MARKETING

Even though lamb prices have continued to be relatively strong during recent years, they often hit a high in late spring and early summer.

¹ Material taken from "Sheep Raising in Ohio" by Grimshaw, Bell, and Judy, 1963.

Large-framed, rapid-gaining lambs that will grade choice or prime should be marketed at approximately 100 pounds, or even 5 or 10 pounds heavier if they will not be penalized in price. Small-framed lambs that finish out at light weights should be marketed at approximately 90 pounds.

Lambs should be pushed for an early market because if they are carried through the summer they often gain more slowly and less efficiently, have more parasites, grade lower, and have a higher death loss.

Suckling lambs will shrink a great deal en route to market. To reduce shrink, you should sort, transport, and weigh them in as short a time as possible. Try to sort spring lambs for shipment the day they are to be sold.

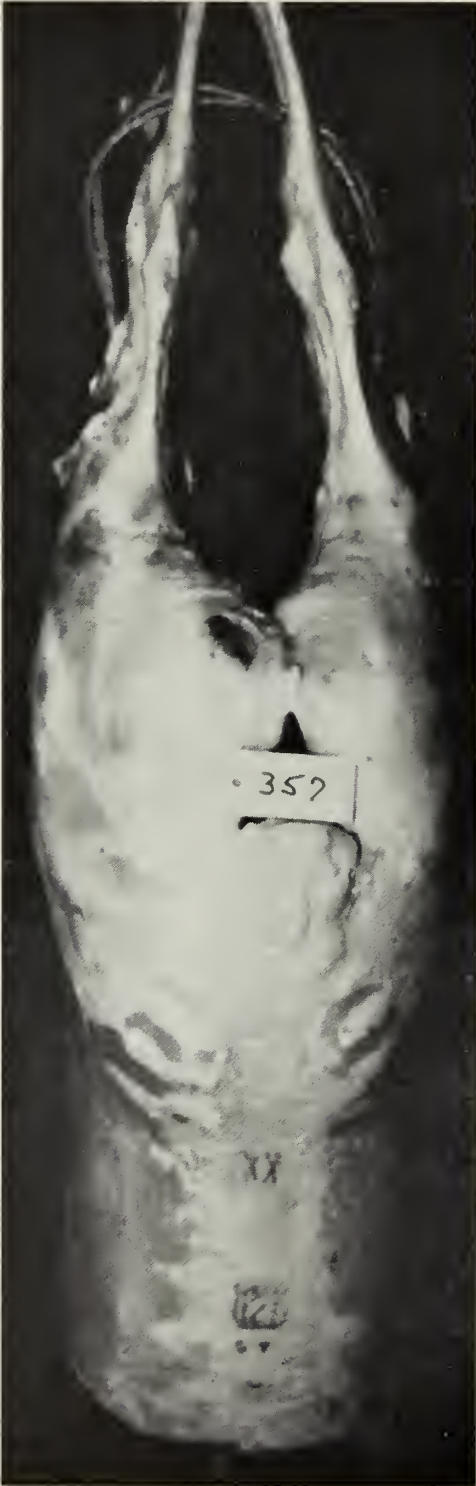
Most Illinois lambs are sold through terminal markets, local pools, and auctions. However, some large commercial flocks move lambs on a direct basis by selling either to a packer representative or an order buyer. Your choice of a market will depend on current prices, markets in your area, numbers of lambs you have to sell, and available transportation.

Easter lambs are milk-fat lambs weighing 40 to 45 pounds. They are sold to meet the demand during the Easter season. Although the price per pound for Easter lambs may seem high, the most important consideration in selling to this specialty market is the number of dollars you will receive per head. Lambs that are ready for the Easter market in late March or April will probably weigh 90 to 100 pounds in June, the normal peak in spring lamb prices, so you must figure carefully to see what will be the most profitable way to market such lambs.

LAMB CARCASS SHOWS

There has been a great deal of interest in carcass shows in recent years, and this interest will probably continue to grow. Carcass shows provide sheepmen, both purebred and commercial, with an opportunity to find out something about the carcass merit of the lambs they are producing. The data from carcass shows point out the extreme amount of variability that exists among market-weight lambs. Table 9 indicates the range that existed in the carcass evaluation data from lambs exhibited at the 1970 Illinois Spring Lamb Carcass Show.

Sheepmen need to use more carcass information in selecting flock sires and replacement ewes. Rams that are siring outstanding meat-type lambs, as indicated by both visual appraisal and carcass data, need to be identified and used more intensively. This need exists for the industry as a whole. The sheep industry needs to expand carcass evaluation work as a means of determining where we are and also measuring our progress in



The production of fast-gaining lambs that have trim, heavy-muscled carcasses should be one of the goals of all sheep producers. The hind saddle pictured at the left and the loin eyes below are from such a lamb. The loin-eye size is 3.1 square inches with loin and rib fat measurements of .12 and .41 inch respectively, on a 64-pound carcass.



**Table 9. — Variability in Carcass Data From 1970
Illinois Spring Lamb Carcass Show**

Criteria	Range
Loin eye area (square inches).....	1.6 to 3.22
Fat thickness over the loin (inches).....	.05 to .60
Fat thickness over the rib (inches).....	.1 to 1.0
Kidney fat (percent).....	1.3 to 6.2
Yield grade.....	1.85 to 5.5
Carcass grade.....	High good to average prime

producing more desirable meat-type lambs. Merely hoping that your lambs will have exceptionally heavy-muscled carcasses with large loin eyes is not enough to get the job done.

WOOL PRODUCTION AND MARKETING

Value of Wool

Harvest the wool crop carefully, for it is a valuable product. Wool is one of the highest priced products sold from the farm, and in many cases it is one of the most poorly managed. It accounts for 15 to 30 percent of the gross returns from sheep.

Fleece weights of brood ewes and rams are important. For example, take two extremes, one ewe shearing 7 pounds and another shearing 14 pounds. With wool, including incentive payment, at 72 cents a pound and lamb at 27 cents a pound, the light-shearing ewe would have to raise 19 pounds more lamb than the heavy-shearing ewe in order to produce the same gross income. It may be well worth your time to pay more attention to the fleece weights of your breeding stock.

Care and Marketing of Fleeces

When you shear sheep and handle fleeces, there are certain important procedures to follow:

1. Shear only when the wool is dry.
2. Shear on a clean, dry surface.
3. Avoid second cuts; remove the fleece in one piece.
4. Remove all tags, dung locks, and stained wool from the fleece, and bag them separately.
5. Roll fleece with the flesh side out and tie securely, but not too tightly, into a neat package.

6. Use paper twine for tying fleeces.

7. Store the tied fleeces in a wool bag in a clean, dry area that is protected from dust, dirt, and rodents.

Fleeces that are full of hay, straw, manure, mud, or other foreign matter are greatly reduced in value. If you live in an area that holds a wool pool, it may be to your advantage to market through the pool. At least check present wool prices before you sell to local buyers so you will have an idea what your wool is worth.

Wool Grades

Since January 1, 1966, new U. S. standards for grades of wool have been in effect. The new standards designate 16 numerical grades, four more than existed previously, and were designed to give the wool industry a more precise and objective means of evaluating wool grades. The grades still retain their traditional numbers, which originally reflected spinning count. Spinning count is based on the number of hanks of yarn (each hank is 560 yards in length) that can be spun from one pound of wool top.

The new standards specify average fiber diameter limits for each grade in terms of microns ($1/25,400$ of an inch). Each grade also contains limits on the variation in diameter allowed among the individual fibers in the lot. If the variability of the individual fibers is greater than the limits specified in the standards, the wool will be graded the next lower grade.



Here a properly tied fleece is being inspected for staple length and grade. Note the wool bag in the background where the fleece will be stored until sold. Note also that the shearing floor has been kept clean.

The new standards provide for the grading of wool by both visual appraisal and actual measurement of fiber diameter.

Before January 1, 1966, the American or blood system and the numerical system were both commonly used; however, producers generally refer to the blood system when discussing wool grades. In this system wool is placed into one of seven major grades based on diameter of fiber. A comparison of the official U. S. grades and the blood system follows.

<i>Official U. S. Grades</i>	<i>American or Blood System</i>
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Finer than grade 80's	
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80's	
------	--

70's	
------	--

64's	
------	--

	Fine
--	------

62's	
------	--

60's	
------	--

	½ blood
--	---------

58's	
------	--

56's	
------	--

	¾ blood
--	---------

54's	
------	--

50's	
------	--

	¼ blood
--	---------

48's	
------	--

46's	
------	--

	Low ¼ blood
--	-------------

44's	
------	--

	Common
--	--------

40's	
------	--

36's	
------	--

	Braid
--	-------

Coarser than grade 36's	
-------------------------	--

Marketing Wool

Selling your wool for the best possible price is important. A higher price per pound not only means a larger check when sold, but a larger wool incentive payment. Most Illinois wool clips are marketed through area wool pools, consigned to wool marketing cooperatives in neighboring states, or sold to wool buyers or their representatives.

When wool is delivered to area wool pools, each fleece is graded according to fineness, length, color, and cleanness. Each producer's clip is weighed by grade and stored with other fleeces of the same grade. At the end of the pool, the wool is sold by grade on a sealed bid basis. Each consignor is paid for his consignment on the basis of grade and sales price.

Wool cooperatives from several neighboring states are accepting wool on a consignment basis through Illinois points. When wool is delivered to one of these points, it is weighed and a cash advance or partial payment is made. The wool is shipped to the cooperative's warehouse, where it is fleece-graded. Each grade is weighed and stored or shipped with other wool of the same grade. The consignor receives final settlement on the basis of grade and price received for that grade, minus the amount of the cash advance.

Wool sold to local dealers is usually sold on a cash basis. Many shearers also buy wool on this basis. These outlets may or may not pay a price differential for various grades.

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